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BY

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I can think of no possible book that is more needed for the medical good that it would do, than a first-class handbook, for opticians. Such a book should be written by one or more opticians of long experience and of more than average intelligence, with the aid of a competent oculist. It should be profusely illustrated in order to show in the simplest and plainest way the best methods of constructing spectacles and of adjusting them to the peculiarities of each face so that they shall not only be perfect optical instruments but also and thereby the best means of therapeutics in the physician's hands. It must never be forgotten that every pair of spectacles has a medical significance, and every suggestion here offered is written with the conviction of its medical influence. It is a strange and sorry absurdity that seems to impel opticans towards taking upon themselves the physician's duty of prescribing, shamefully forgetting and neglecting the veriest rudiments of their own peculiar work. If they cannot and actually *do* not make proper optical instruments and fit them properly, it is hardly probable that they will be able to prescribe them. It is an old saying that faithfulness in a few things brings rulership over many. If one would in any city, take a hundred spectacle-wearers passing any door it would be found that not ten per cent. had properly-made, and fittingly-adjusted frames. This is not indeed, wholly the optician's fault, because the best spectacles are often rendered ill-fitting by the wearer's carelessness and ignorance of how to care for them. But even here there is some blame due the optician, because he should have it distinctly understood with his customer that all spectacles need readjustment every month. More than this, the optician should give every customer a pamphlet or slip of instructions as to how to wear and care for his spectacles, and how he may know when they are out of adjustment.

But the wearer's carelessness is not by any means the chief cause of the trouble. Rightly, mechanically, and conscientiously made and fitted at first, spectacles do not get out of adjustment with the quickness that the good-for-nothing trash does that is commonly sold.

My present interest in the matter is one born of a conviction that is the result of every day's experience, that physicians themselves are sadly neglectful of the therapeutic importance of these facts. I myself have been so and I know that others are. The optician's neglect is partially excused by that of the oculist, and their common dereliction of duty is the patient's common misfortune. The oculist's duty is not ended with writing the prescription for glasses nor that of the optician by selling them. Patient and customer must be warned as to the danger of ill-fitting glasses, and promises exacted as to frequent returns to physician and to store, in order to make quite sure that frames are kept straight and properly adjusted.

The failure of oculists to realize the importance of proper frames and adjustment is clearly shown by the fact that in no treatise on refraction or ophthalmology is the subject adequately treated. In hardly one is it even mentioned, whilst hundreds of other matters of far less importance are discussed in pages and chapters.

My interest in the fact is purely medical and no fact has been more commonly impressed upon my mind than this of the harmful effects of ill-made and ill-fitting glasses. There is hardly a day that, despite all warnings and cautions, patients do not return to me with complaints of recurrence of all old-time headaches, reflex troubles, and ocular symptoms. A glance at the spectacles shows the *fons et origo mali*, and they are at once sent to the optician, with a speedy disappearance of the symptoms so soon as readjustment has been made. Of what use is it to work for an hour to rightly estimate an astigmatic axis and degree, if a twisted lens undoes all work? Of what use to estimate ametropia and muscle-imbalance if improper centering of lenses and, adjustment of frames turn our prescriptions into prisms? If we believe that uncorrected ametropia is of vast significance in occasioning disease and morbid reflexes, then we must logically conclude that an ill-adjusted glass uncorrects our correction, and brings about again what we had aimed to remedy.

There are many and intricate mathematical estimates and calculations possible as to the prismatic effects of decentered and mal-inclined lenses, but such questions I shall not presume to discuss, contenting myself instead with a few of the simplest and crudest suggestions concerning aspects that are brought home to my attention by daily experience. I shall speak at first only of spectacles, leaving the eye-glass question for separate consideration.

I allow patients to choose whether their spectacles shall be "rimless," or with eye-wire, but strongly urge the advisability of "hooks."

1. If of gold, the frame should be "14 karats fine." This insures the greatest degree of hardness, temper, and durability. It is possible that the new alloy of aluminium and nickle may prove of great service, but at present gold frames are the most advisable ; steel frames, if carefully nickelled, will be of more service than the plain steel. The question of expense at once arises. The 14 K. gold frames of the proper weight or quality of metal, of coursə cost much more than the fragile sort of the 8 K., or even 10 K. degree of fineness commonly sold. The oculist may encourage the patient to buy such expensive frames by the assurance that they are "cheaper in the long run," but more rightfully by emphasis of the medical aspect of the question. Most patients, even the poorest are determined to have gold frames. It were better to have a heavy rigid steel frame than a flimsy, wabbling, gold one. It is the silliest folly to allow a patient with reflex symptoms and of a sensitive nervous temperament to wear the limp, stringy bridges and frames that tradesmen who know no higher law than money-getting will shamelessly sell.

2. A very large proportion of the spectacle-frames sold are of too light weight. There is not enough metal to insure the proper rigidity and preservation of shape. With the usual thin and light bridges and temple-pieces they must necessarily become bent out of shape in a short time. Moreover, when so fragile, the lens is shaken with every step or movement of the head, and a dancing, inaccurate image is thus constantly thrown upon the retina, inevitably producing ocular labor and weariness. A frame should be so solid and so solidly set as to allow of no quivering of the lenses. The heavier the lenses the more necessary is a solid rigid frame.

The so-called "swelled bridge" is a nuisance. It is indeed desirable to have the broad, bearing-surface upon the crest of the nasal bridge, but this must not be obtained at the expense of the metal in the arms, as is done in the swelled bridge. The bridge in its entire length should be of uniform weight. The bridge, arms and all, even in the heavier frames should have a rigidity greater relatively to the rest of the frame than is commonly the case, in order to gain the desired stiffness of the whole mechanism.

3. Vibration, quivering, or insecurity of the frames, with motion of the head, or in walking, must be avoided. The means to be taken to render these impossible are :—

a. Sufficient heaviness and rigidity of the whole frame and especially of the bridge.

b. Absolute lack of looseness, or "play" of the fastenings of the straps of the bridge and end-pieces, and of the end-piece joints.

c. A bridge that fits the peculiarities and irregularities of the nose, and the sides of which are in apposition with the sides of the nose.

d. Straight non-curving temple-pieces from the end-pieces to the tops of the ear, sharpness of the curve at the top of the ear, and conformity of the wire behind the ear to the curve of the ear.

e. Fitting of the wire behind the ear to the depression next the mastoid process and head,—*i. e.*, non-riding of the wire upon the ear away from the head.

f. And, most important of all, close apposition (without cutting, however,) of the temple-pieces with the skin and scalp of the sides of the head, in so much of their extent as possible.

4. The frames, and especially the bridge, must be so perfectly tempered as to admit of the frequent and extreme bending and shaping always necessary before a perfect fit can be secured.

5. The saddle-bridge must clasp the sides of the nose widely or if you please deeply, and not rest simply upon the crest of the nose. The extent to which this can be done depends upon the height and shape of the nose, and in any case makes necessary a long arm and usually a sharp curve from the bend to the bridge-strap. The saddle-bridge must also clasp the nose closely or be in exact apposition on both sides. There must be no "play," but also of course, no decided pressure upon the sides of the nose. Various devices have been made to lesson or distribute the pressure on the crest of the nose, that is sometimes necessary. A good way is by means of small metal carriers fastened at the lower extremities of the bridge, and holding pieces of cork that rest on each side of the nose.

6. The temple-pieces must be straight from the end-piece to the top of the ear, and the curve must begin at this point with the same degree of sharpness that the curve of the back part of the ear itself has. Nothing betrays more stupidity mechanically than a temple whose curve begins at the end-piece and meanders up through the hair of the head, landing somehow and somewhere behind the ear. There should also be some endeavour to make the curve of the wire behind the ear conform to the inequalities of ear curve. The length of the temple-piece must be right, *i. e.*, made different for nearly each person. The wire is bound to cut the ear or make the lenses sit wrong, unless this is looked after. Sometimes one temple-piece is required as much as one-half inch longer than its fellow, and then much care and ingenuity will be required to insure no maladjustment of the lenses due to this asymmetry of the position of the ears themselves.

7. By general consent the French glass and lenses, known as "the A B frame," are the hardest, purest, and most generally satisfactory. Periscopic lenses in anything but plain sphericals are expensive, and except in sphericals are of doubtful advantage. In sphericals the per-

iscopic form of lens is used up to about 8 D.; above this biconvex or biconcave are preferred. In simple hyperopic astigmatism the plane side is next the eye. In compound hyperopic astigmatism the side having the least curvature is usually placed toward the eye. In simple myopic astigmatism the cylinder should be toward the eye. In compound myopic astigmatism the greater curve is usually placed toward the eye, but there are exceptions to this rule when one must use judgement in each individual case.

8. The optical center of the lenses should be as near the geometrical center as possible. The optical center must be accurately located and indicated by a dot of ink or paint. This spot showing the center should be left on the lenses until the physician has examined the lenses and their adjustment. The axis of astigmatism may also, and especially if not at 90° or 180°, be indicated by a fine ink-tracing across the lens. To test the accuracy of the axis-placing, the stenopaic slit in the trial frame may be put over the adjusted spectacles and the coincidence of the two lines observed.

9. The optical centers of the lenses must cover the pupils at the most-used position of the eyes. To realize this necessity tests the optician's mechanical skill to the utmost. Because, either,

a. The eye or its pupil upon one side is often at a greater or less distance from the center of the crest of the nose than the pupil of the fellow-eye.

b. One eye or its pupil may be placed higher than the other.

c. The peculiarities of the bridge of the nose, of the eye-brows, or of the contour of the adjacent parts, may demand peculiar adjustments.

d. The habits or occupation of the patient may cause special adaptation, a lower or higher placing, etc. .

e. The centers in lenses used for reading alone must be narrower or nearer each other, and lower, than in those for distance alone. For constant use the centering must be a compromise; if the patient be a hard worker at near-range, the adjustment should be almost the same as if for near-work alone; if the patient does little near-work the centering may be almost the same as if for distant use alone. The higher the refractive error, or the greater the reflex symptoms, the more accurate must be the adjustment for the most straining work. In these cases it is better to order two pairs, the refractive power of the lenses, so well as the centering, being more accurately suited to the two purposes of near and distant use.

10. An extremely important thing is the proper inclination of the lens. How often one sees lenses so placed that the axis of vision strikes the lens at an angle as acute as that of the second stroke of a narrow capital letter V. The muscles in such cases are strained, the

light is lost by reflection, the axis of vision pierces the lens at its lower edge thus transforming the lens into a prism—ocular irritation is sure to follow. Since most of our vision is downward, all lenses, even those worn for distant use alone, should be inclined so that the visual axis shall strike the lens perpendicularly when the eyes are directed to the ground, say ten feet in front. If the patient be a hard worker at near-range the inclination should be such that the visual axis is nearly perpendicular when looking at the book, the sewing, or the writing-paper. But all patients should be urged by Doctor and by Optician to use low chairs or high desks, the latter inclined if possible, to get book, newspaper, or sewing up as near to a level with the eyes as possible, and sit up straight.

11. The eye-lashes must not strike the lens; if they do the lens is soon soiled and the eye irritated both by the obscurity and the repeated strokes of the lashes against the lens in winking. When the eye is prominent and the lashes long it is decidedly advisable to trim the lashes a little so the lens can be brought closer to the eye. I have found by many experiences that without this, spectacles would have been a failure. When by long lashes a lens is necessarily placed at a great distance from the cornea there must follow muscle-strain either of the eyes or of the neck. The closer the lens to the cornea, the better.

12. The angle of the bridge with the lenses, and the traction of the temple-piece "hooks" or ear-curves, must be such that the saddle-bridge shall rest in the natural depression or seat of the nose, and the inclination of the flattened part of the saddle-bridge such that neither of its edges shall cut into the nose.

13. All of the above suggestions are to be doubly emphasized in the case of the improved bifocal lenses that I have recommended to the Profession. The size and the shape of the presbyopic segment are matters requiring care and delicacy of judgement on the part of the oculist, whilst questions concerning thinness, cementing, centering, etc., etc., and of adjustment at the very precisely right level, and at the exquisitely proper inclination,—are wholly essential to satisfaction in their use. Until opticians know how to make and adjust them with fine skill and accuracy, it is comparatively useless to advocate their very general use. I have prescribed them in over a hundred cases with less than a half dozen failures.

14. As to pince-nez or eye-glasses, it is the daily bore of my life to keep people with astigmatism or a nasal conformation that renders the use of eye-glasses almost impossible, from wearing such absurd optical instruments. In some obstinate cases I have refused to continue recognizing the person as patient. In many instances an expert optician can adjust an eye-glass so that the axis of astigmatism

is not twisted from the correct angle, or so that the ocular muscles are not put to irritating strain. But vanity too often pays a fearful penalty for its satisfaction.

But, instead of merely clumsily and superficially, perhaps errorfully, touching upon a few of the many important parts of the subject, if I had written the full and scientific treatise that the optician, not the oculist, should long since have produced—there would still remain the pertinent remark that all rules and instructions can help but a very little toward the realization of the ideal. Inherited mechanical capacity, the interested mind, the supple and expert manipulative skill, must learn by experience the lessons that words cannot teach—one of these lessons being that the little things, the veriest details of the optician's handicraft, have direct or remote, but constant significance and influence upon health and happiness.

The Care of Spectacles by the Patient.—I consider it a part of my duty to instruct patients in the details of the care of their delicate little optical instruments. I show them by illustration how to put the glasses on and how to take them off without wrenching the joints, and bending the frame out of adjustment; and without soiling the lenses by banging them against the eye-lashes or lids; and also how to clean the lenses without endangering the lenses, or the form of the frame. I tell them to use only an old clean, unstarched cotton or linen handkerchief or cloth for polishing the lens,—never using the handkerchief used on the face and never using chamois leather, tissue paper, silk, etc. I advise ammoniated rose water for cleansing the lenses. I caution them not to fold the frame up at night, nor lay the lenses upon their face. I put the greatest stress on keeping the frame straight, and instruct each patient how maladjustment may be detected, why it works injury, and make them promise to return to the optician frequently for the correction of possible misplacements of the glasses. If the lenses are prismatic I explain the temporary distortion of objects, and if otherwise of high power I give especial hints as to their use and misuse. In all cases I urge elevation of the book, paper, writing, etc., as near as possible to a level with the eyes, the proper placing of the light, or of the body as regards the light, the wisdom of frequent little rests in protracted reading, etc., etc. Patients need these little bits of advice, the medical results are better, and though constant repetition is somewhat tiresome to oneself, I have found that in the long run it avoids annoyance and trouble.

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